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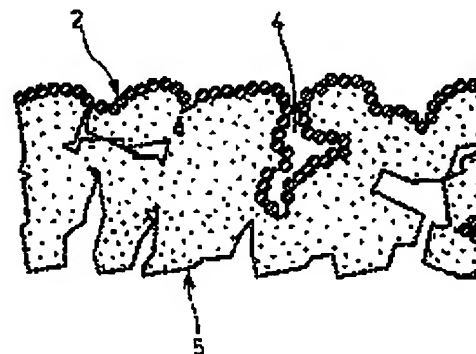
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(54) 【発明の名称】 ポーラスコンクリート

(57) 【要約】

【課題】 二酸化チタンで形成される触媒層の表面積を大きくすることができ、高い有害ガス分解性能、吸音性能、セルフクリーニング性能を兼ね備え、さまざまな用途に活用し得るポーラスコンクリートを提供する。

【解決手段】 セメントペーストと骨材を混ぜて固まりすることで空隙4が形成されるようにしたポーラスコンクリート5において、ポーラスコンクリート5硬化前に二酸化チタンを噴霧し、表面に触媒層2を形成する。



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【特許請求の範囲】

【請求項1】 セメントペーストと骨材を混ぜて固練りすることで空隙が形成されるようにしたポーラスコンクリートにおいて、ポーラスコンクリート硬化前に二酸化チタンを噴霧し、表面に触媒層を形成したことを特徴とするポーラスコンクリート。

【請求項2】 セメントペーストに増粘剤を混入した請求項1記載のポーラスコンクリート。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、ポーラスコンクリートに関するものである。

【0002】

【従来の技術】近年、光を吸収することにより化学反応の触媒として働く光触媒が注目されている。

【0003】光触媒として代表的なものは二酸化チタン(TiO_2)であるが、二酸化チタンをコンクリートの表面に付着させて触媒層を形成し、該触媒層での光触媒反応により大気中の NO_x や SO_x といった有害ガスを分解し無害化しようとする技術が研究開発されている。

【0004】この種のコンクリートに関する発明としては、従来、例えば、特開平10-158079号公報に記載されたようなものが存在し、これは、図2及び図3に示される如く、発泡コンクリート製ブロック1の表面に、バインダーとしてのセメントペーストと二酸化チタンを混合したものを噴霧し表面に付着させ、触媒層2'を形成することにより、コンクリートブロック3を構成するようにしたものである。

【0005】前記発泡コンクリート製ブロック1は、アルミニウム粉末等をセメントペーストと砂等の骨材に混ぜて多量の気泡を発生させることにより、微小な空隙4'を多数形成し、比重をおよそ0.5程度としたものである。

【0006】前述の如きコンクリートブロック3は、高速道路の遮音壁等として用いられ、二酸化チタンで形成された触媒層2'の光触媒反応により、大気中の NO_x や SO_x といった有害ガスを分解し無害化して、触媒層2'に保持し、該触媒層2'に保持された物質は、降雨時に雨によって触媒層2'から洗い流されるようになっている。

【0008】又、前記コンクリートブロックコンクリートを用いているため、図3に：ほとんどの空隙4'が独立しており、追：とから、貯水・透水性はほとんど有して：盤として利用したり、或いは路面に雨水：回還すべき道路舗装として利用すること：いた。

【0009】本発明は、斯かる実情に鑑：ンで形成される触媒層の表面積を大きく：き、高い有害ガス分解性能、吸音性能、：ング性能を兼ね備え、さまざまな用途に：ラスコンクリートを提供しようとするも：

【0010】

【課題を解決するための手段】本発明は、ストと骨材を混ぜて固練りすることで空：ようにしたポーラスコンクリートにおい：ンクリート硬化前に二酸化チタンを噴霧：層を形成したことを特徴とするポーラ：かかるものである。

【0011】前記ポーラスコンクリート：メントペーストに増粘剤を混入すること：【0012】上記手段によれば、以下の：られる。

【0013】ポーラスコンクリート硬化：ンを噴霧すると、二酸化チタンがバイン：メントペーストの内部に隠れることなく、：クリート表面並びに該ポーラスコンクリ：するように形成される空隙の内表面に効：触媒層の表面積を大きくすることが可能：での光触媒反応により大気中の NO_x や S ：害ガスを効率よく分解し無害化すること：しかも、ポーラスコンクリートは音が内：め、吸音性能にも優れ、又、二酸化チタ：着した物質を自己分解反応により酸化分：リーニング性能も有しているため、ほと：着しにくく常に表面がきれいな状態であ： x や SO_x と反応して生成される酸も極め：表面を劣化させる心配もない。

【0014】このような有害ガス分解性：セルフクリーニング性能に優れたポーラ：

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ート表面に対する二酸化チタンの付着性がより良好となり、触媒層の表面積を更に増加させることが可能となり、有害ガス分解効率が向上する。

【0017】

【発明の実施の形態】以下、本発明の実施の形態を図示例と共に説明する。

【0018】図1は本発明を実施する形態の一例であって、セメントペーストと砂利等の骨材を混ぜて固練りすることで空隙4が形成されるようにしたポーラスコンクリート5において、ポーラスコンクリート5硬化前に二酸化チタンを噴霧し、表面に触媒層2を形成したものである。

【0019】前記ポーラスコンクリート5は、水セメント比をおよそ25～30〔%〕程度とし、通常のコンクリートを製造する場合に比べ、水分をかなり少なくした状態で練る（固練り）ことにより空隙4が形成されるようにしたものであり、該空隙4は、一つ一つが大きく且つ連続しているものが多く存在する。又、ポーラスコンクリート5の比重はおよそ2.0程度となり、曲げ強度は増粘剤を混ぜることによりおよそ4.5〔N/m²〕程度となる。尚、ポーラスコンクリート5の空隙率は、配合により練り混ぜ前に調整することが可能である。

【0020】図みに、発泡コンクリートの水セメント比はおよそ25～30〔%〕程度であって、比重は前述したようにおよそ0.5程度で、曲げ強度はおよそ1.0〔N/mm²〕程度となっている。

【0021】次に、上記図示例の作動を説明する。

【0022】ポーラスコンクリート5硬化前に二酸化チタンを噴霧すると、二酸化チタンがバインダーとしてのセメントペーストの内部に隠れることなく、ポーラスコンクリート5表面並びに該ポーラスコンクリート5表面に開口するように形成される空隙4の内表面に効率的に付着し、触媒層2の表面積を大きくすることが可能となり、触媒層2での光触媒反応により大気中のNO_xやSO_xといった有害ガスを効率的に分解し無害化することが可能となる。尚、噴霧する二酸化チタンの粒径を微細化すれば、より多くの二酸化チタンがポーラスコンクリート5表面に付着する形となる。

【0023】しかも、ポーラスコンクリート5は音が内

セルフクリーニング性能に優れたポーラス5は、道路の遮音壁、発電所や工場の壁の汚染や騒音の激しい箇所の建材等として、より、公害低減に有効となる。

【0025】又、ポーラスコンクリート発泡コンクリートのようにほとんどの空いているものとは異なり、連続しているもの貯水・透水性に優れ、植生基盤として利用は路面に雨水が溜まることを回避すべき利用することも可能である。

【0026】こうして、二酸化チタンで触媒層2の表面積を大きくすることができ、分解性能、吸音性能、セルフクリーニング性能、さまざまな用途に活用し得る。

【0027】更に、前記ポーラスコンクリートでは、セメントペーストにポリマーエマルジョンを混入すると、強度が増大するほか、ポーラスコンクリート5表面に対する二酸化チタンより良好となり、触媒層2の表面積を更に大きくすることが可能となり、有害ガス分解効率が向上する。

【0028】尚、本発明のポーラスコンクリートの図示例にのみ限定されるものではない旨を逸脱しない範囲内において種々変更は勿論である。

【0029】

【発明の効果】以上、説明したように本発明に記載のポーラスコンクリートによれば、形成される触媒層の表面積を大きくすることにより有害ガス分解性能、吸音性能、セルフクリーニング性能を兼ね備え、さまざまな用途に活用し得る効果を得る。又、本発明の請求項2に記載のポーラスコンクリートによれば、上記効果に加え、ポーラスコンクリート表面に対する二酸化チタンの付着性がより良好とし得、触媒層の表面積を更に増加し、有害ガス分解効率は向上し得るという優れた効果を得る。

【図面の簡単な説明】

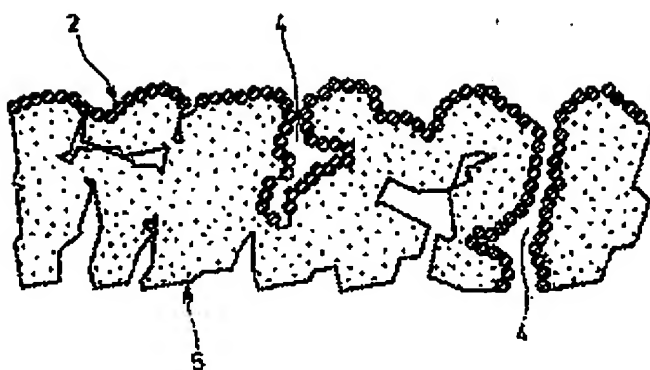
【図1】本発明を実施する形態の一例の断面図である。

【図2】従来の発泡コンクリートで形成したブロックの一例の斜視図である。

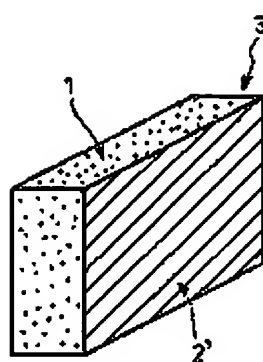
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【図1】



【図2】



【図3】



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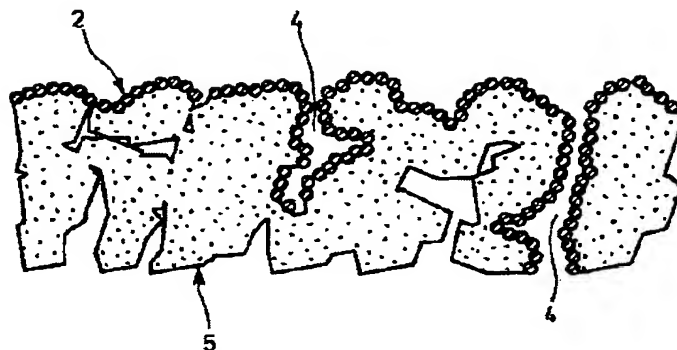
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TITLE : POROUS CONCRETE



ABSTRACT : PROBLEM TO BE SOLVED: To provide porous concrete which enables to enlarge the surface area of a titanium dioxide catalytic layer, and which has high performances to decompose harmful gases, absorb noise and clean itself and is used in various applications.

SOLUTION: In the porous concrete 5 in which pores 4 are formed by mixing a cement paste and an aggregate and kneading the resulting mixing into a stiff paste, titanium dioxide is sprayed on the porous concrete before the porous concrete 5 hardens so as to form the catalytic layer 2 on the surface of the porous concrete.

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(71)Applicant : ISHIKAWAJIMA HARIMA HEAVY
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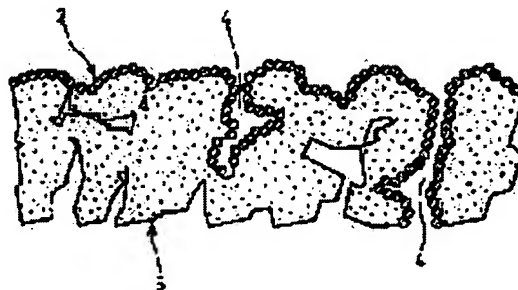
(72)Inventor : TODA KATSUYA

(54) POROUS CONCRETE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide porous concrete which enables to enlarge the surface area of a titanium dioxide catalytic layer, and which has high performances to decompose harmful gases, absorb noise and clean itself and is used in various applications.

SOLUTION: In the porous concrete 5 in which pores 4 are formed by mixing a cement paste and an aggregate and kneading the resulting mixing into a stiff paste, titanium dioxide is sprayed on the porous concrete before the porous concrete 5 hardens so as to form the catalytic layer 2 on the surface of the porous concrete.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to porous concrete.

[0002]

[Description of the Prior Art] The photocatalyst which works as a catalyst of a chemical reaction attracts attention by absorbing light in recent years.

[0003] Although a thing typical as a photocatalyst is a titanium dioxide (TiO₂), a titanium dioxide is made to adhere on the surface of concrete, a catalyst bed is formed, and research and development in the technique which is going to decompose harmful gas called NO_x and SO_x in atmospheric air by the photocatalysis in this catalyst bed, and it is going to defang is done.

[0004] As invention about this kind of concrete, what was indicated by the former, for example, JP,10-158079,A, exists, and this constitutes a concrete block 3 by spraying what mixed the cement paste and the titanium dioxide as a binder on the front face of the block 1 made from aerated concrete, making it adhere to a front face, and forming catalyst bed 2' in it, as shown in drawing 2 and drawing 3.

[0005] By mixing an aluminium powder etc. with the aggregates, such as cement paste and sand, and generating a lot of air bubbles, said block 1 made from aerated concrete forms much minute opening 4', and makes specific gravity about about 0.5.

[0006] The matter which the concrete block 3 like the above-mentioned was used as a noise-proof wall of a highway etc., decomposed and defanged harmful gas called NO_x and SO_x in atmospheric air by the photocatalysis of catalyst bed 2' formed with the titanium dioxide, held to catalyst bed 2', and was held at this catalyst bed 2' is flushed by rain from catalyst bed 2' at the time of a rainfall.

[0007]

[Problem(s) to be Solved by the Invention] However, since what mixed the cement paste and the titanium dioxide as a binder was sprayed and it was made to adhere by the conventional concrete block 3 which was indicated by JP,10-158079,A to the front face of the block 1 made from aerated concrete hardened completely, the titanium dioxide itself may have hidden in the binder, the surface area of catalyst bed 2' may have become small, and it may have become difficult to fully gather the harmful gas decomposition effectiveness by the photocatalysis.

[0008] Moreover, since aerated concrete is used for said concrete block 3, almost all opening 4' has been independent and it is not continuing as shown in drawing 3, it cannot use that hardly have storage of water and water permeability, but use as a vegetation base or storm sewage collects on a road surface as road pavement which should be avoided.

[0009] This invention can enlarge surface area of the catalyst bed formed with a titanium dioxide in view of this actual condition, tends to have high harmful gas resolvability ability, the absorption-of-sound engine performance, and the self-cleaning engine performance, and tends to offer the porous concrete which can be utilized for various applications.

[0010]

[Means for Solving the Problem] In the porous concrete with which the opening was formed by mixing

and ***** (ing) cement paste and the aggregate, this invention sprays a titanium dioxide before porous concrete hardening, and starts the porous concrete characterized by forming a catalyst bed in a front face.

[0011] In said porous concrete, it is effective to mix a thickener in cement paste.

[0012] According to the above-mentioned means, the following operations are acquired.

[0013] It adheres to the internal surface of the opening formed without a titanium dioxide hiding in the interior of the cement paste as a binder if a titanium dioxide is sprayed before porous concrete hardening so that opening may be carried out to a porous concrete surface list on this porous concrete front face efficiently, it becomes possible to enlarge surface area of a catalyst bed, and it becomes possible for the photocatalysis in a catalyst bed to decompose efficiently harmful gas called NO_x and SO_x in atmospheric air, and to defang. And since a sound diffuses porous concrete inside, it excels also in the absorption-of-sound engine performance, and since it also has the self-cleaning engine performance which carries out oxidative degradation of the matter with which the titanium dioxide adhered to the front face by the autolysis reaction, dust, dirt, etc. are in a condition with an always beautiful front face that it is hard to adhere. Furthermore, the acid which reacts with NO_x and SO_x and is generated is also a minute amount very much, and there is also no fear of degrading a front face.

[0014] The porous concrete excellent in such harmful gas resolvability ability, the absorption-of-sound engine performance, and the self-cleaning engine performance becomes effective in public nuisance reduction by using as air pollution, building materials of the part where the noise is intense, etc.

[0015] Moreover, since the opening of porous concrete has many which are continuing unlike that which almost all openings have been independent of like aerated concrete, it can also use that excel in storage of water and water permeability, and use as a vegetation base or storm sewage collects on a road surface as road pavement which should be avoided.

[0016] In said porous concrete, if a thickener is mixed in cement paste, the adhesion of the titanium dioxide to a porous concrete <DP N=0003>-TO front face will become better, it will become possible to make the surface area of a catalyst bed increase further, and harmful gas decomposition effectiveness will improve.

[0017]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with the example of illustration.

[0018] Drawing 1 is an example of a gestalt which carries out this invention, in the porous concrete 5 with which the opening 4 was formed by mixing and ***** (ing) the aggregates, such as cement paste and ballast, sprays a titanium dioxide before porous concrete 5 hardening, and forms a catalyst bed 2 in a front face.

[0019] An opening 4 is formed of what is scoured where said porous concrete 5 made the water cement ratio about 25-30 [%] extent and moisture is considerably lessened compared with the case where the usual concrete is manufactured (*****), and, as for this opening 4, many things which each is large and are continuing exist. Moreover, the specific gravity of the porous concrete 5 becomes about about 2.0, and flexural strength turns into about 4.5 [N/mm²] extent by mixing a thickener. In addition, it kneads by combination and the voidage of the porous concrete 5 can be adjusted in front.

[0020] Incidentally, the water cement ratio of aerated concrete is about 25-30 [%] extent, and as specific gravity was mentioned above, flexural strength is about 1.0 [N/mm²] extent about by about 0.5.

[0021] Next, actuation of the above-mentioned example of illustration is explained.

[0022] It adheres to the internal surface of the opening 4 formed without a titanium dioxide hiding in the interior of the cement paste as a binder if a titanium dioxide is sprayed before porous concrete 5 hardening so that opening may be carried out to a porous concrete 5 surface list on this porous concrete 5 front face efficiently, it becomes possible to enlarge surface area of a catalyst bed 2, and it becomes possible for the photocatalysis in a catalyst bed 2 to decompose efficiently harmful gas called NO_x and SO_x in atmospheric air, and to defang. In addition, if particle size of the titanium dioxide to spray is made detailed, it will become the form where more titanium dioxides adhere to porous concrete 5 front face.

[0023] And since a sound diffuses the porous concrete 5 inside, it is excellent also in the absorption-of-sound engine performance, and since the titanium dioxide also has the self-cleaning engine performance which carries out oxidative degradation of the matter adhering to a front face by the autolysis reaction, neither dust nor dirt can adhere easily and it is excellent in the scene. Furthermore, the acid which reacts with NO_x and SO_x and is generated is also a minute amount very much, and there is also no fear of degrading a front face.

[0024] The porous concrete 5 excellent in such harmful gas resolvability ability, the absorption-of-sound engine performance, and the self-cleaning engine performance becomes effective in public nuisance reduction by using as the noise-proof wall of a road, an electric power plant, air pollution called the wall surface of works, the building materials of the part where the noise is intense, etc.

[0025] Moreover, since the opening 4 of the porous concrete 5 has many which are continuing unlike that which almost all opening 4' has been independent of like aerated concrete, it can also use that excel in storage of water and water permeability, and use as a vegetation base or storm sewage collects on a road surface as road pavement which should be avoided.

[0026] In this way, surface area of the catalyst bed 2 formed with a titanium dioxide can be enlarged, and it has high harmful gas resolvability ability, the absorption-of-sound engine performance, and the self-cleaning engine performance, and can utilize for various applications.

[0027] Furthermore, in said porous concrete 5, if thickeners, such as a polymer emulsion, are mixed in cement paste, reinforcement not only increases, but the adhesion of the titanium dioxide to porous concrete 5 front face will become better, it will become possible to make the surface area of a catalyst bed 2 increase further, and harmful gas decomposition effectiveness will improve.

[0028] In addition, as for the porous concrete of this invention, it is needless to say that modification can be variously added within limits which are not limited only to the above-mentioned example of illustration, and do not deviate from the summary of this invention.

[0029]

[Effect of the Invention] As mentioned above, as explained, according to the porous concrete of this invention according to claim 1 Surface area of the catalyst bed formed with a titanium dioxide can be enlarged. Have high harmful gas resolvability ability, the absorption-of-sound engine performance, and the self-cleaning engine performance, can do so the outstanding effectiveness that it can utilize for various applications, and according to the porous concrete of this invention according to claim 2 In addition to the above-mentioned effectiveness, further, can make better adhesion of the titanium dioxide to a porous concrete front face, the surface area of a catalyst bed is made to increase further, and the outstanding effectiveness that harmful gas decomposition effectiveness may be improved can be done so.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the expanded sectional view of the surface part of an example of a gestalt which carries out this invention.

[Drawing 2] It is the perspective view of an example of the concrete block formed with conventional aerated concrete.

[Drawing 3] It is the expanded sectional view of the surface part in an example of the concrete block formed with conventional aerated concrete.

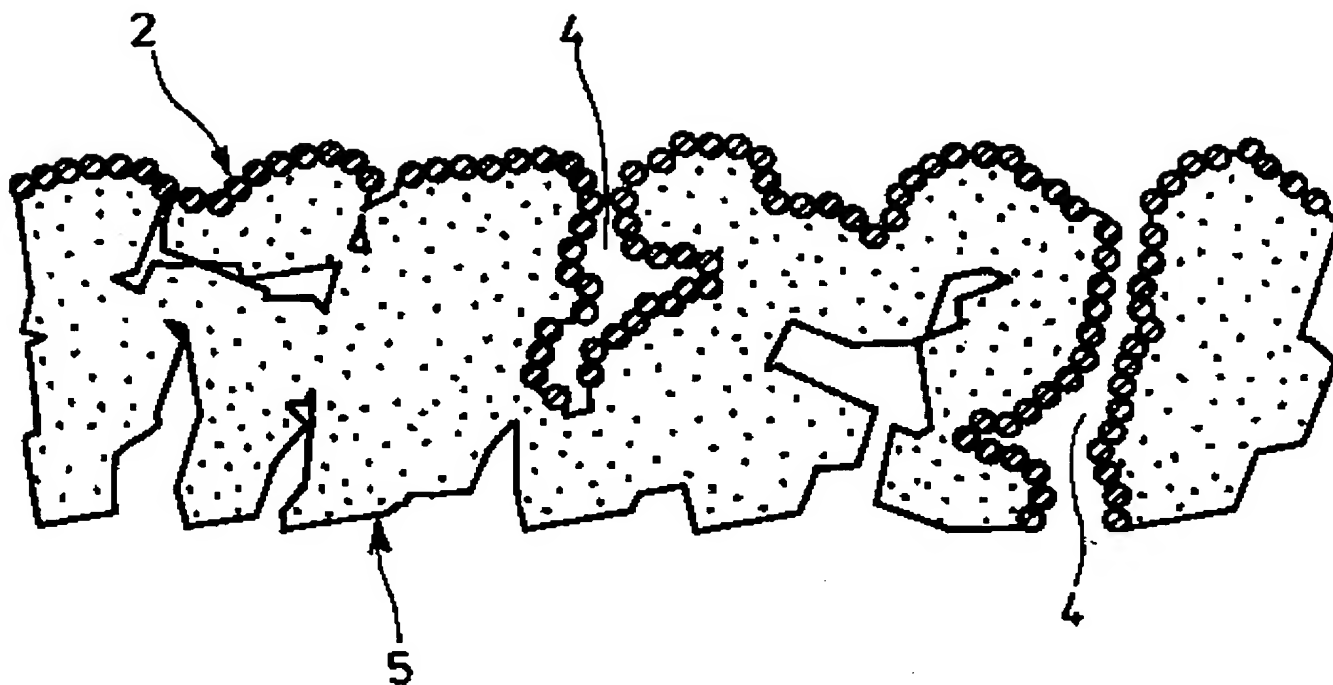
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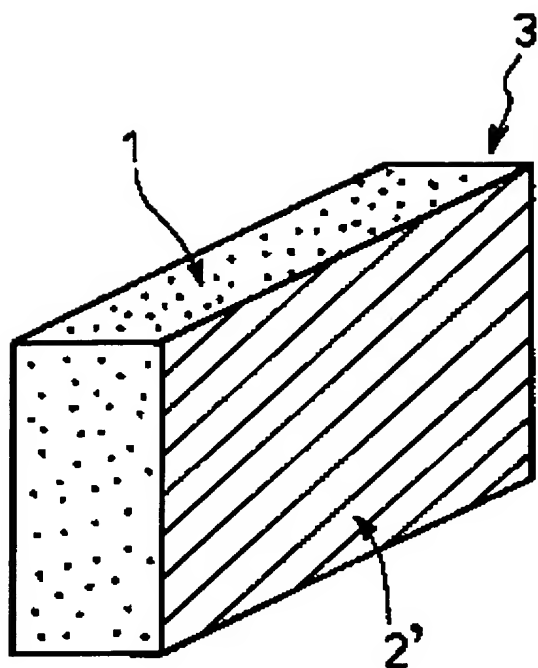
2 Catalyst Bed

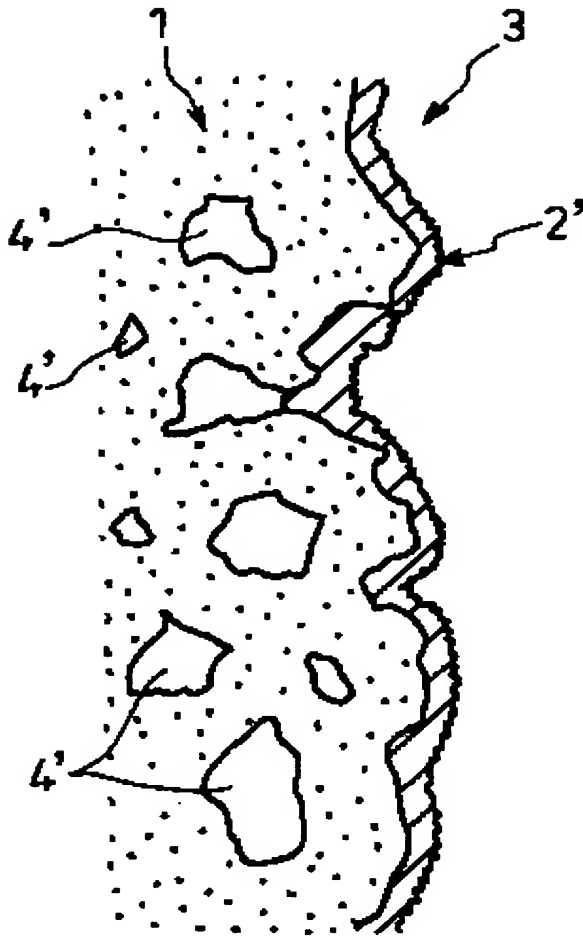
4 Opening

5 Porous Concrete

[Translation done.]







* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] Porous concrete characterized by having sprayed the titanium dioxide before porous concrete hardening, and forming a catalyst bed in a front face in the porous concrete with which the opening was formed by mixing and ***** (ing) cement paste and the aggregate.

[Claim 2] Porous concrete according to claim 1 which mixed the thickener in cement paste.

[Translation done.]